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ORIGINAL ARTICLES.

REMARKS ON GLIOMA OF THE RETINA AND THE QUESTION OF ROSETTES.*

By ADOLF ALT, M.D.

GLIOMA of the retina is a well establised clinical entity. It is a tumor of the retina which makes its appearance in infancy, frequently at such an early period of infancy that that it may be considered as congenital, and, if left to itself, not only destroys the eye or eyes affected, but the life of the afflicted individual in a comparatively short space of time. Its malignancy, equal to that of the small cell sarcoma, while varying in intensity, is its chief characteristic feature and the cases reported in earlier literature in which gliomata are said to have undergone a regressive metamorphosis which led to a cure, must, in the light of modern science, probably be rejected as errors in diagnosis. We know now that a child affected with glioma is doomed to an early death and under horrible circumstances, unless the eye be removed at the earliest possible date. Even then, however, our efforts may be and are often unsuccessful, although every one of us probably have had a number of cases in which the early removal of one such eye or perhaps of both, saved a life. There is little to add to the well known clinical picture and it is not the object of this paper to waste time with it.

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It is different with our knowledge of the genesis and histopathology of this terrible disease, and, while much time and intelligent labor has been bestowed on the unraveling of its secrets, we have, I think, not been altogether successful in determining its true nature and origin.

In discussing the pathogenesis of glioma we have to turn back to its first intelligent description. In his classical lectures on tumors, on which the modern views on glioma are based, (Berlin, 1864) Virchow says: "The nature of the neuroglia differs very much in different places. It is sometimes firmer and more like connective tissue, sometimes so soft that it appears as an amorphous or granular substance. The structure of the neuroglia, where it is most characteristic, is such that we find round, lentilshaped, or spindleshaped, or branched cellular elements, lying at some distance from each other in a very soft and therefore very easily destroyed substance which is at once changed by pressure, water, and so on, and which when examined in a fresh state has a finely granular appearance. * * * *

* * * * This substance appears traversed by fine fibrillæ crossing each other in all directions, of which it is difficult to say, whether they are preexistent or result from a coagulation of the original substance. * * * *

* * * * The cellular elements contained in this substance are extremely friable so that in consequence of cutting, pressing or teazing the majority is destroyed and only their nuclei are found surrounded by a loose substance which is not unlike the intercellular substance. * * * *

* * * * It is not at all certain whether these cells are round or branched. In hardened specimens it appears often, as if the fibrillar network was formed by the cell branches."

A more localized hyperplasia of this tissue he terms glioma and gives a very detailed description of the different forms of glioma of the brain. Their course is in general a very slow one and they may grow to a considerable size before causing any morbid symptoms.

He later goes on to say: "Into this category we must place certain tumors of the retina, which thus far have been called carcinoma bulbi. These are progressive growths, coming from the soft connective tissue of the retina, which in their

structure correspond exactly with the brain tumors just described. But, it is very difficult to sever them from sarcomata, etc." Later on again he says: "I have already stated that there are transitions to sarcoma and that these gliosarcomata give us much matter for thought."

In the following decades numerous investigators added but little to Virchow's description. The main question raised was always, whether we had to look upon glioma as a special form of tumor grown from neuroglia or as a small round cell sarcoma, and in this question no uniform opinion has been reached even to this day. My own leaning was always towards the sarcoma side, since I could and cannot understand, how glioma of the brain, a comparitively slow growing, almost benign tumor, and glioma of the retina a rapidly growing, destructive, and extremely malignant tumor, could be essentially the same. The different authors have found retinal glioma to spring in turn from all the different layers of the retina, yet, we can hardly say that these statements are of real value as glioma has so far not been seen in its earliest beginning. Most observers think that one of the granular layers gives rise to glioma. Since Ginsberg has found in two microphthalmic eyes the elements of which the retina consists were in places transposed, so that elements of one layer were situated in one to which they did not belong. Greef believes that in accordance with Cohnheim's theory we may assume that glioma may and probably always does spring from such misplaced tissue germs. Greef himself and after him Hertel have found glia cells (spidercells) in retinal glioma by means of the Golgi-Cajal method. They and other observers have also found ganglion cells and Lagrange went even so far as to distinguish between four different forms of glioma, one of which he characterizes by the presence of ganglion cells. Having examined a considerable number of gliomata and having as a rule found smaller and larger parts of retinal tissue still recognizable, even in the interior of tumors which filled the eyeball, I cannot see why such findings should be looked upon as anything extraordinary. These cells are probably nothing else but the remnants of the affected retina and not newly formed. Their presence seems therefore quite natural.

Aside from ganglionic cells I have often found whole patches of neuroglia cells and fibres which evidently belonged to the inner layers of the retina and which were undoubtedly preformed and not belonging to the new growth, although they were burried within it. (Fig. 1).

We differentiate, as is well known between two forms of glioma: glioma endophytum, in which the growth at first affects the inner parts of the retina and grows inwards towards the axis of the eye squeezing the remains of the retina towards the sclerotic and later on the lens and iris

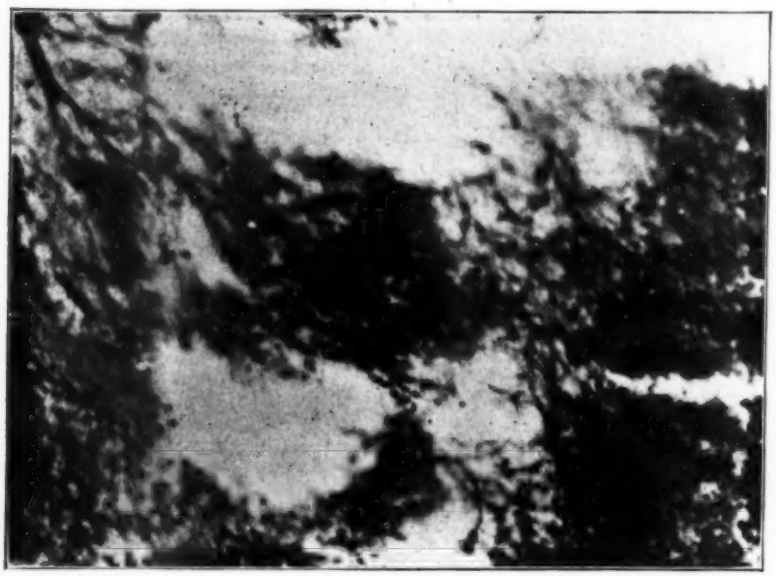

FIG. 1.

against the cornea; and a glioma exophytum, in which the tumor springs from the outer layers of the retina and leads at an early stage to detachment of this membrane. In the progress of the disease, the regular typical stages of all intraocular growths are gone through till perforation occurs at the corneoscleral margin or backwards into the orbital tissue and metastases occur in the cranium and distant organs leading to death.

It is now generally conceded that the typical structure of glioma is that of spherical and cylindrical lobules, almost each and everyone of which has a centrally located bloodvessel.

The glioma cells thus forming a spherical or tubular mantle around the bloodvessel are biggest and most vigorous in the immediate neighborhood of the vessel, but at a certain and strangely uniform distance from the vessel they abruptly show all the characteristics of degeneration. New cell cylinders may grow into this degenerated mass and when the whole eyeball is filled with glioma, the typical structure may no longer be recognizable and the tumor appears to consist solely of round cells of varying sizes with here and there a bloodvessel. Evidences of frequent hæmorrhages into this tissue are never wanting, even in small gliomata.

When examining into the nature of the cells of which the tumor consists we can distinguish the following:

1. Small round cells, often giving off small branches and thus appearing bipolar or multipolar, of which by far the largest part of the glioma consists. They have a large nucleus and very little protoplasma. As stated above Greef and Hertel seem to have proven these to be neuroglia cells in the sense of Virchow's description.

2. Larger, sometimes very large, round cells containing cell débris and pigment granules, probably leucocytes. Also polymorpho-nuclear leucocytes and round cells with an oval nucleus.

3. Slightly spindleshaped or clubshaped cells, especially directly around bloodvessels.

4. Ganglion cells.

5. Pigment epithelium cells, often only recognizable as such by a few pigment granules.

The authors are not agreed whether or not there is an intercellular substance between these cells.

Besides the cells there are fibres and sometimes fibrous septa, remnants of the fibrous structures of the retina and atrophied bloodvessels.

The bloodvessel walls are seen to undergo different modes of degeneration, the hyaline degeneration of the endothelium (Fig. 2) as well as of the outer walls, being the most frequent. Later on deposits of lime take place within the tumor and in its periphery. They appear first as small roundish bodies enclosed in cells, later on greater quantities may form large plates and roundish conglomerates. The

quantity of such lime deposits varies greatly in different tumors.

In a number of gliomata certain figures are found in the sections among this apparently uniform mass of cells which while well known long ago, were not looked upon as anything important and which were thought to be due to the infolding of the retina, until in 1897 Wintersteiner published his startling monograph on *The Neuro-epithelioma of the Retina* imparting a particular and important role to these formations. He described them under the name of *Rosettes* in the following

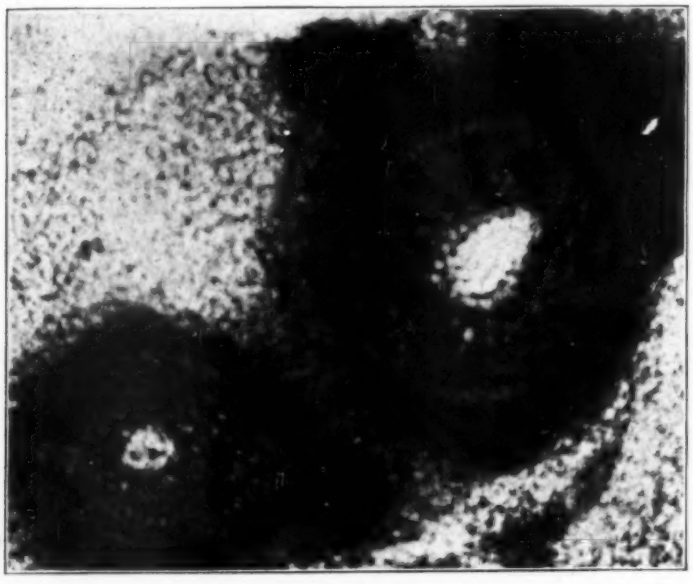

FIG. 2.

manner: "In the most pregnant cases rosette-like formations are found which with a low and medium magnifying power look very much like transverse sections of glandular tubes. They consist of from 12 to 20 slender, cylindrical cells arranged in a circle. In their club-like broader distal end lies the round or oval mucleus, while towards the lumen we find a small amount of protoplasma which is at first broad and then narrows neck-like, and finally swells up to a basal plate ending in a sharp glistening line. The "feet" of these cells touch each other, so that their basal lines together form a continuous basal membrane toward the lumen. The lumen

of the rosette is mostly empty, but frequently I could detect some contents within it, viz: 1) small club or rod-shaped elements which are stained only with protoplasma stains and which adhere with their smaller ends to the basal membrane of the cylindrical cells, or lie free in the lumen; 2) cells which are in every respect like the cells of the tumor, just as they are lying outside of the rosette." He further states that these formations are essentially hollow spheres, although they *may have an opening on one side where the margins may*

FIG. 3.

be rolled in, as seems to be the rule, so that tumor cells can penetrate into the cavity. In this way he explains certain spiral figures and partial rings. The shape and number of these formations vary greatly in different tumors. Sometimes they seem to be altogether absent, in others they are so frequent that they fill the whole field. Neither is there any rule as regards the locality in which they are found within the tumor. He even found them in an extra bulbar growth in the neighborhood of the optic nerve.

As to their origin Wintersteiner comes to the conclusion

that: "These rosette, ribbon and arc-like cell formations must be looked upon as aggregates of rodfibres and, perhaps, conefibres. Their nuclei, therefore are the equivalent of the granules in the outer granular layer, the glistening line toward the lumen of the rosette of the limitans externa and the particles of protoplasm which adhere to it are rudiments of undeveloped rods and, perhaps cones." Thus, what had been considered as accidental, natural and unimportant, was by Wintersteiner given such an important place

FIG. 4.

in the histogenesis of glioma of the retina that he even gave to the tumor the name of neuroepithelioma retinae.

Ginsberg does not accept this view and thinks that the cells forming rosettes are not neuroepithelial in nature, but rather cells of the primitive retina which have not yet been differentiated into spongioblasts and neuroblasts and he compares the cells forming the rosettes with those of the pars ciliaris, which indeed they resemble very much. He thus, also, considers them to be different in character from the glia cells.

Greef, while accepting Wintersteiner's views as to the rudimentary neuroepithelial character of the rosettes, says:

"Glioma is a tumor which takes its origin from a malformation in the retina, from misplaced embryonic cells. It consists in the main of hyperplastic glia cells and a network of fibres formed by their branches."

According to these views, then, what has been described as a scant granular intercellular substance, seen by some, denied by others, probably is the fibrous network belonging to the glia cells, and the rosettes are due to different tissue elements.

In 1901 Brown Pusey having stained glioma sections with

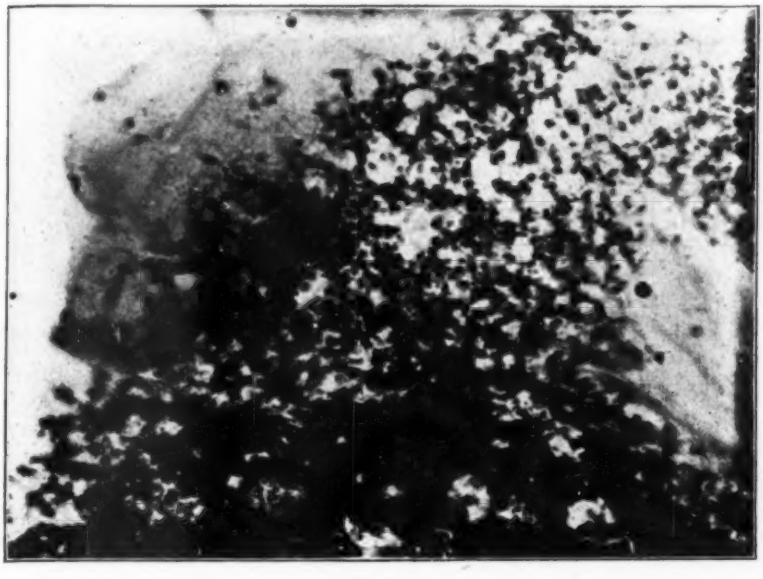

FIG. 5.

Mallory's phosphotungstic hæmatoxyline thought he had proven that fold of the inner surface of the retina formed the rosettes and that the glistening line described by Wintersteiner was nothing else than the membrana limitans interna retinæ. In a more recent paper on retinal rosette formations of neuroglia in inflammatory processes, he acknowledges that this was a mistake and he declares himself satisfied that he had to deal with the membrana linitans externa. However, the rosettes which he described and which are of common occurrence and well known to every eye pathologist seem to me to differ from what Wintersteiner called rosettes,

since they are undoubted remnants of a once fully developed, but diseased and partly destroyed retina, just as we find them in a great many specimens of detached retinæ, the atrophied folds of which are glued together, as they may even as such be found, also, in cases of glioma, where they can always be recognized as folds of the formerly fully formed retina. (Fig. 3). Even Murakami describing such rosettes in a microphthalmic eye, in my opinion, has fallen into this error.

Brown Pusey further on in his last paper says: "It may

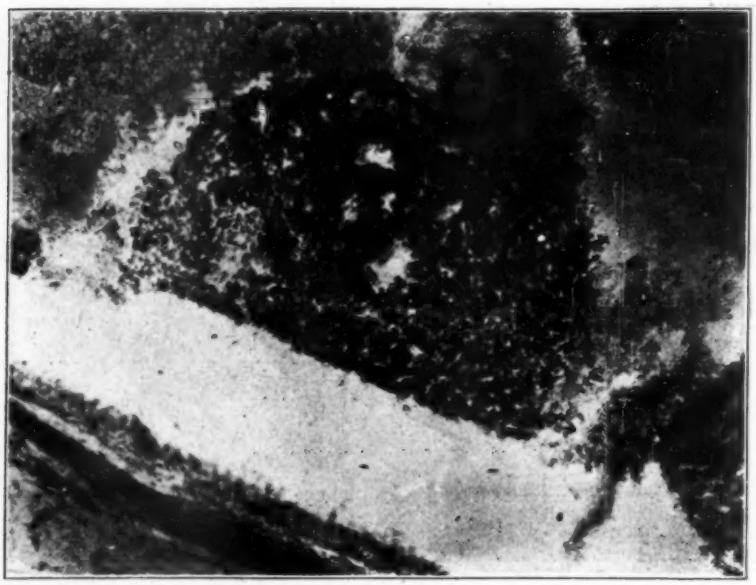

FIG. 6.

be permissible to say that the conclusion that the rosettes are neurogliar in character is much more in harmony with the general teachings of pathological anatomy and is more nearly what we would expect, from the findings of *similar rosette formation in gliomas arising in the brain*, than the suggestion that these formations are made up of cells which form rudimentary rods and cones.

Being convinced of the fact that Wintersteiner must mean something quite different and having recently obtained a number of glioma eyes from my own practice and that of others, I studied these as carefully as I could in order to

have an opinion of my own on this question. The results of this study I wish to bring now before you and to illustrate with numerous photographs. I had at my disposal specimens of nine older cases of glioma from my own collection, five specimens kindly loaned me by friends and two new cases of my own. These latter eyes I cut in series without interruption. The rosettes of Wintersteiner I found in five of these cases. Whether they might not have been found in most or all of these cases, had a sufficiently complets examination been made, is impossible to tell. At any rate the rosettes which I have found correspond in the main with the de-

FIG. 7.

scription and drawings of Wintersteiner and cannot be confounded with folds of a previously well developed retina, as described in the cases of Pusey and Murakami.

In trying to get an understanding as to the nature and origin of the rosettes I found in these glioma specimens, as I had seen previously in many degenerating retinæ, a large number of openings, transverse sections of small cavities, especially where the outer layers of the retina could still be recognized and which I thought might have some bearing on rosette formation. It seems that these openings are lying more especially in the external granular layer. (Fig. 4). While

they usually appear to be empty or perhaps to contain a colorless perfectly transparent fluid, they are in some sections traversed by numerous fibres which can be traced back to the cells from which they spriug and which I take to be neuroglia cells Such cells and fibres are found quite frequently also in parts of gliomata, where from their arrangement there must be looked upon as belonging to the inner layers of the retina. (Fig. 5). The exact character of these openings it is difficult to deter-

FIG. 8.

mine, unless, they are akin to the larger cavities formed for instance in socalled gliosis of the spinal chord, where they are considered to be due to the degeneration of glia tissue. It, therefor, does not seem that these particular cavities have anything to do with the formation of rosettes. But there are other openings to be seen, especially in the sections of young nodules which are just formed or forming on the choroid, sometimes, also, in a remnant of vitreous body. (Fig. 6 and 7). These look much more like the Wintersteiner rosettes and differ from them only by the fact that the lumen always

contains one or more pigment epithelium cells, or normal or degenerating red blood cells. Still, I think that these are really rosettes in their earlier stages. The tumor cells surrounding these openings have no peculiar shape; they are simply round cells, but they are pressed together more closely than those lying more peripherally.

In the periphery of the tumors and in the secondary nodules, which grow up like plants from seed, wherever glioma cells have happened to fall, pigment epithelium cells are very frequently found enclosed between the tumor cells. Such a pigment epithelium cell having become destroyed and the pigment having been carried away, may well leave behind a hollow sphere to mark its former site.

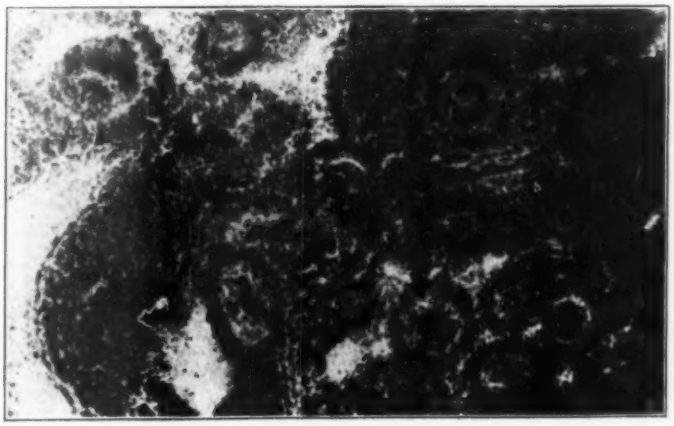

FIG. 9.

In eyes with a detached retina, especially after an injury to the anterior part of the eye, we often find a coagulated exudation filling all the space between choroid and retina. In such cases the exudation, where it lies on the pigment epithelium, looks as if it had been corroded, because every pigment epithelium cells is surrounded by a clear, perfectly transparent spherical area, and even when the pigment cell itself has disappeared, such a clear space marks its former position. Whether this is an exudation from the pigment cell or not, is hard to say, but it seems that a similar formation might also take place when a pigment epithelial cell is surrounded by glioma cells. (Fig. 8).

Such observations, and others which I shall detail, make it very probable that Wintersteiner rosettes may be found when glioma cells grow around some tissue enclosure, and there is much to offer in support of such a view.

It is a striking fact that the tendency of growth in a glioma is not in a plane, but in a spherical or cylindrical manner. Young nodules spring forth from older ones in a way which may best be compared to the formation soap bubbles, only the glioma nodules are solid. Only where the glioma tissue encounters a more resistant tissue, like the limitans interna

FIG. 10.

or externa of the retina, or the lamina vitrea of the choroid, does it grow for a time in a plane along such an obstacle, till it has broken through it in some place, when at once a spherical growth begins. Such facts can be best studied in the peripheral, the younger parts of the tumor. As a rule, every such spherical and younger bud shows a centrally located bloodvessel, around which the cells seem to group themselves; when by pressure the spherical growth is forced to assume a cylindrical or tubular shape, the bloodvessel lies in its axis. In the early stages the tumor cells immediately surrounding such a bloodvessel are round and of the same shape as the more peripheral ones. (Fig. 9). In older nodules, however,

these more densely packed, central cells often—not always by any means—assume a cylindrical or spindle shape and thus in the sections form a marked darker ring around the bloodvessel wall. Should in such a case the bloodvessel wall become degenerated and disappear, the result would be, and I think often is, Ginsberg's statement notwithstanding, a Wintersteiner rosette. Yet, Wintersteiner says the rosettes are made up only of rudimentary rods or cones, or tumor cells. Even if I should be wrong in the opinion that rosettes may be formed in the manner just described, I have found numer-

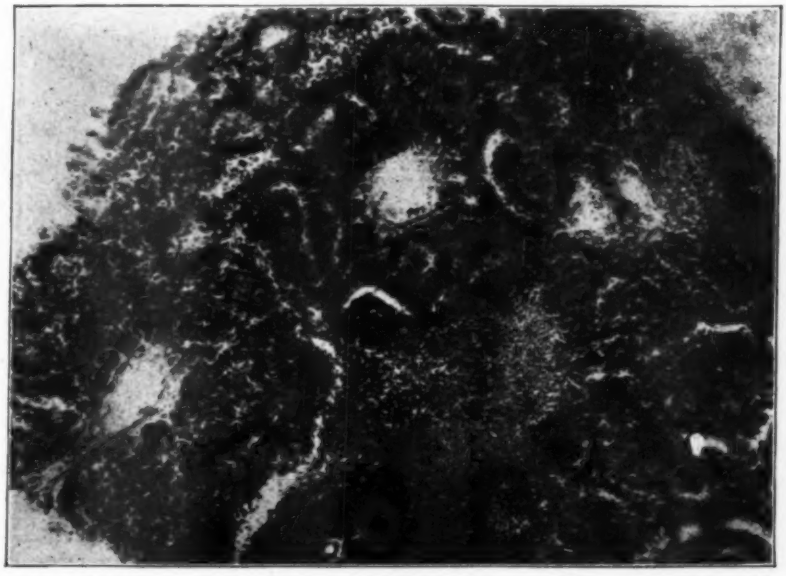

FIG. 11.

ous rosettes which instead of being characterized by the so-called rod and cone fibers and cells with a limitans externa, are formed by round cells in no way different from the other tumor cells in their neighborhood. (Fig. 10). Many of the formations I have seen are so grotesque in shape that the hollow sphere of Wintersteiner and other observers can have had nothing to do with their formation. There is nothing unreasonable in assuming that in the same manner as rosettes maybe formed around bloodvessels, they may also be formed around lymph channels, whether these are preformed in the retina or newly formed during the growth of the tumor.

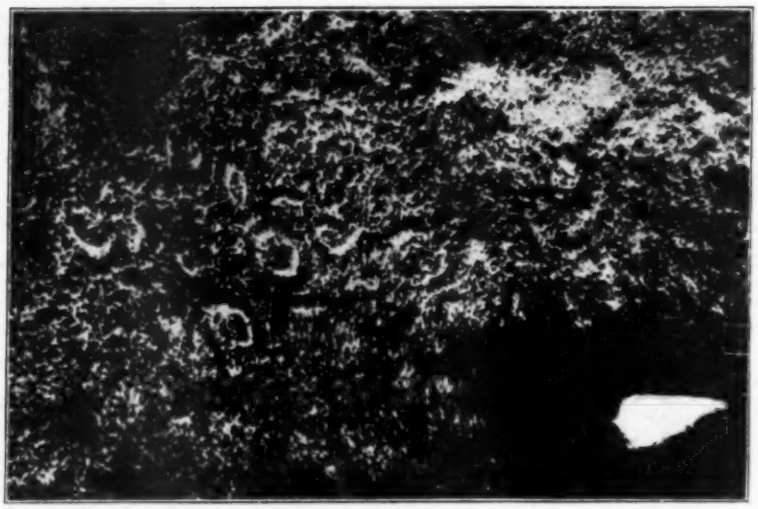

FIG. 12.*

If, as some authors will have it, the peculiar shape of the cells composing the ring around the bloodvessel is due to their lying so closely to the source of nutrition and consequently overfeeding, the same may be the case with the cells surrounding a lymph channel.

Many rosettes in my specimens do not simply form a ring

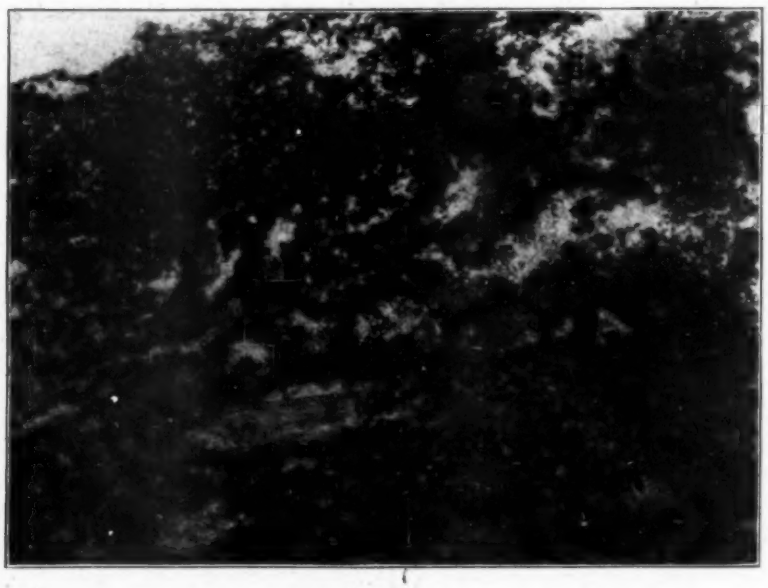

FIG. 13.

and only one ring. (Fig. 11). The majority, even, form curved channels, sometimes arranged in such a manner that the similarity to the distribution of small bloodvessels is very striking. (Figs. 12 and 13). These, as well as rings, have often a central mass of tissue, tumor cells, I think, surrounded by a transparent, perhaps empty, space. Two rings surrounding such a cell mass concentrically are quite frequent. (Fig. 14). The glistening membrane which Wintersteiner calls the limitans externa and which he finds almost always, is often absent, or, as Ginsberg says, it is

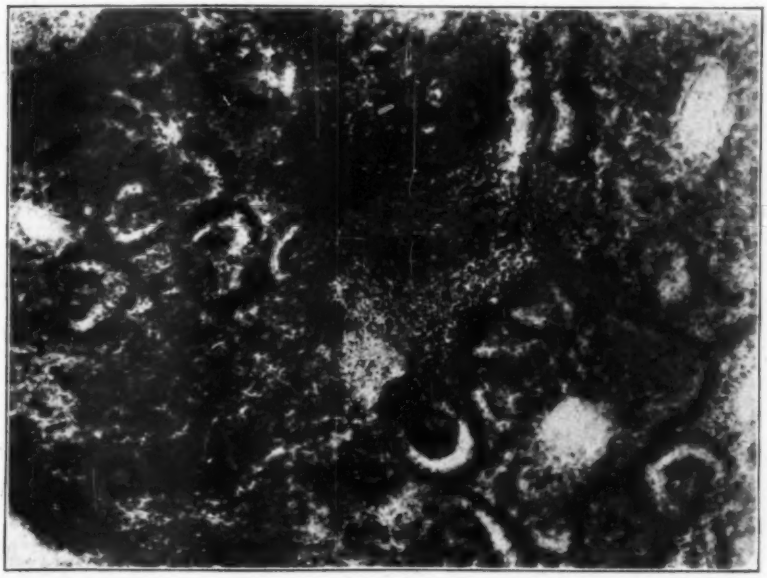

FIG. 14.

simply the sharply defined outline of the ends of the cells surrounding the opening.

While the foregoing seems to point to the fact that rosette formation is due to the growing of tumor cells around a tissue enclosure, I am not at all blind to the fact that many tissue enclosures do not produce rosettes. There must evidently be certain special conditions present which lead to rosette formation, perhaps of an osmotic nature.

If the rosettes are not due to rudimentary rods and cones, the importance given to them by Wintersteiner, and the name neuro-epithelioma, are out of place.

Pusey, without giving his authority, says that rosettes have also been found in glioma of the brain. This would decidedly support my views.

He also gives to the presence or absence of rosettes in a glioma a practical side, by asking whether retinal gliomata with rosettes are less malignant than those without such formations. A priori, I should from the foregoing say that their presence or absence can have no bearing on the clinical character of the tumor, and, in fact, from observation in some of my cases, I know this to be so.

Rosettes, therefore, may be looked upon probably as mere accidents of growth in a glioma.

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DISCUSSION.

Dr. H. Gifford (Omaha): I cannot say I have any important contribution to make, but I think Dr. Alt's observations are worthy a great deal of consideration, because this question, from a microscopic standpoint, is important. I rise particularly to see if I can get any light on the clinical diagnosis of glioma. I have under observtion now a child, I have kept track of for the past six years, who came to me with the typical picture of glioma. I was on my guard against making a snap-shot diagnosis of glioma, fearing it might be a case of pseudo-glioma, as I had been fooled on that in my earlier career. It had none of the history of the slight or severe inflammation which is apt to precede the pseudo-glioma, but all the appearance of the yellow, glistening nodules coming out in the clear vitreous, and none of the dull yellowish appearance of pseudo-glioma. Altogether, I felt justified in saying that the child had glioma without

question. The mother declined to have the operation done, but she has brought her in for examination every six months since. The tumor has kept increasing, at no time showing signs of inflammation. The lens has become opaque in a peculiar way, having a yellowish, uniform appearance, and now looks like a celluloid imitation of ivory. This fills up the whole lens capsule. The child is perfectly well, and although I have tried to get the specimen every time I have seen the patient, I have not succeeded yet. I may have made a mistake. It is a question whether some gliomata do not last longer than we expect without killing the patient. The pressure was at no time increased. On the other hand, it has not decreased. The iris is perfectly uniform and normal in appearance, except slightly pushed forward out of the normal plane. Another case is that of a little girl in which I enucleated the eye some fifteen years ago, in whose case the diagnosis was also apparently unquestioned and in which I confirmed the diagnosis with the microscope. My sections showed that the glioma cells reached back into the optic nerve, clear back to the point where it was cut off. I recommended most urgently that she have an evisceration of the orbit. The parents refused to have any further operation performed, and yet the girl is alive and well to-day.

Dr. Edward Jackson: Dr. Gifford's case of a child under observation for six years with an ophthalmoscopic diagnosis of glioma, without the usual progress of the case, brings to mind one I have seen where the microscopic appearearance justified the diagnosis of glioma. The lens was clear; the anterior portion of the vitreous was clear, but the upper two-thirds or three-fourths of the vitreous were apparently filled with the mass. This occurred, however, in a woman of 40 years of age, with a history of an eye blind for many years, and of course the probable diagnosis is cystic degeneration in the retina; but it raises the question whether Dr. Alt's observation as to the cavity formation around epithelial and other cells derived from the normal tissue, offer any explanation of these rare cases that have been reported, some of which have been enucleated for glioma, and which are certainly not of the malignant character of glioma. It is the only case of the sort I have ever seen, where I

thought the ophthalmoscopic diagnosis of glioma would be justified, but where the patient had been for years without change and the tension remained perfectly normal.

Dr. B. E. Fryer (Kansas City): The Academy is to be congratulated and should be thankful for this admirable paper with illustrations by Dr. Alt. There are very few of us who have the patience to go through the work required to produce such a paper, to say nothing of the illustrations. Moreover, there are very few, even, well advanced pathologists who know how to interpret all that is shown here, as he does so perfectly and fully. From the standpoint of a pathologist, it seems to me the Doctor has made everything very, very clear, and he should be congratulated and thanked for it. It would also seem that such observations confirm the Cohnheim theory more completely, and, while it is still under judgment of the pathologists, I feel that it will be more and more confirmed.

Dr. Eugene Smith (Detroit): I wish to report a case seen in consultation. It was a glioma of the retina, as far as I could tell, but the pathological examination showed it to be an unpigmented round cell sarcoma. The eye was enucleated, supposing it to be a glioma of the retina. I would like to ask if a case of that kind is as malignant as the gliomatous sort. Would that have some bearing on these cases living for some time? Are such cases rare?

Dr. Alt (closing discussion): In regard to the case of probable tumor of the retina which Dr. Gifford reported, I had a similar experience eight or ten years ago. A boy between five and six years old was brought to my clinic. He was blind in one eye, and I found a tumor mass in the vitreous which filled the posterior half of the vitreous cavity with the retinal bloodvessels, as I took them to be, on the surface. They were so arranged. We must not forget that we do not really see the glioma, but only the anterior portion of the retina. My diagnosis in this case was glioma, and I wanted to enucleate the eye, but was not allowed to do so. I found on examining the case carefully that the child was the subject of hereditary syphilis, and instituted a vigorous anti-syphilitic treatment. After five or six months the tumor began to shrink gradually and to get smaller and smaller, and about a

year and a half from his first visit to me I found there was no tumor, but the retina, with numerous atrophic patches, was back in its normal position. It thus became clear that it was a gummatous tumor of the retina which had grown deeply into the vitreous body. Perhaps Dr. Gifford's and Dr. Jackson's cases are of a similar, or of a tuberculous nature.

With regard to the question of Dr. Jackson whether what I have described may explain the formation of retinal cysts, I do not really know. All retinal cysts which I have seen have been connected with detachment of the retina. The way in which they were formed was that fluid was retained between retinal folds which were crowded together; later the walls of such a cyst gradually become thinner, and several smaller cysts may coalesce to form larger ones.

The unpigmented, round cell sarcoma in a child, referred to by Dr. Smith, is not new. I have seen and published two such cases. In both cases the tumor sprang from the deeper cells of the ciliary body and grew into the anterior chamber through the meshes of the ligamentum pectinatum.

A CRITICISM ON THE USE AND ABUSE OF THE LACRIMAL PROBE.*

By GEORGE F. SUKER, M.D.

AKRON, OHIO.

THE trend of argument to be pursued in this paper is to offer substantial vindication on the one hand that the use of the very large lacrimal probe is bad ophthalmic practice, and on the other to conservatively uphold the employment of the small or medium probes as infrequently as possible. The writer is fully cognizant of the fact that he is discussing a question which has an array of able supporters on either side. He is likewise aware that a greater proportion of them are staunch adherents of the very large probe rather than the small or medium probe for all such conditions for which the writer exclusively advocates the small one. It must be admitted, however, that the adherents of either the one or the other are obliged to look upon those affections that necessitate the use of any probing as a *bête noir* in ophthalmic

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surgery. Again, there is a good deal of truth in the saying that "If you once pass a lacrimal probe, that patient is liable to become a probe victim for ever and a day." As a matter of fact, all probes are an evil, and the larger the lacrimal probe the greater the ultimate evil that ensues from its unwise employment.

The rather promiscuous employment of the large lacrimal probe had its inception in the use of large sounds for urethral conditions which in part are analogous to those in the lacrimal canal. If there was a closer anatomical analogy between these two canals than really exists, then perhaps there would be for similar conditions more of a justification in the use of the very large lacrimal probe. The anatomical surroundings, however, being so unlike in their fundamental structures and conditions, the use of the large probe or of large sounds is permissible in the one (urethra) and precluded in the other (lacrimal canal) upon a purely physical basis, if upon no other more valid one.

It is not the writer's purpose to enter into any discussion as to the relative merits of the various kinds of treatment to be pursued in cases of lacrimo-nasal obstructions. But, it is his specific desire to confine himself to such points only as have a direct or indirect bearing on the passing of any lacrimal probe.

It is not contended that a fair amount of rather rapid dilatation of a lacrimal stricture is not a good regimen, but that a rapid and excessive dilatation, as has been the vogue, is a policy to be heartily deprecated. For, the lacrimo-nasal canal permits of but a limited amount of dilatation, and beyond this point you secure a dilatation by compression which verges upon destruction of functionating tissue. The essential factor is not how large a canal can be obtained, but one how nearly physiological. The size of the canal plays no important factor in the drainage of the tears, so long as no actual stricture or other obstruction exists. Clinical demonstrations of this assertion are plentiful and self-evident. Our object should be to restore a patulous canal and interfere as little with the caliber of the canal as is consistent with this object. In the very strict sense of the term there is scarcely an actual canal, as the walls are in contact with each other on all

sides. The greatest average diameter of the canal in the cadaver is but scant 6 mm.; while in the living subject it is considerably less because of the periosteum, submucous lining, vascular network, lymph-gland supply, and the ciliated epithelium. The usual diameter of the canal in the cadaver does not exceed 3 to 4 mm., and therefore less in the living because of the anatomical structures just detailed. In view of this then, how can a sound or probe of 3 or 4 mm. diameter enter a rather tortuous canal of practically the same dimension? It cannot do so without injuring the soft tissues and thereby seriously imperiling their proper function.

The physiology of the removal of the tears will offer several additional points clearly contraindicating the use of the very large probe. The flow of tears to the nose is not a simple physical phenomenon, but rather a complicated one. Briefly stated, there are six theories which endeavor to explain this act. They are as follows: (1) The siphon theory; (2) the capillary theory; (3) the aspiration theory; (4) the sac compression theory; (5) the sac dilatation theory; (6) the lid closure theory. There are many who accept only one or the other of these theories. The writer, however, maintains that each and every one of the several methods plays a part in the conduction of the tears. Upon carefully considering the anatomy of the canal in relation to these theories of tear drainage, the use of the very large probe is, in the majority of instances, distinctly inconsistent practice. Though there are perhaps conditions arising in certain portions of the canal in which a large probe might be of some service, yet its use being injurious to a part of the canal, is of necessity so for the entire canal. This is upon the principle that which is true of the part is true of the whole. In the normal condition of affairs, the walls of the canaliculus, nasal canal, and to a certain extent the walls of the sac, are in touch everywhere. This contact of walls is obligatory to sustain the capillary theory of the downward flow of the tears. Therefore, our endeavor to establish a large and patulous canal as of necessity must follow the use of the very large probe, is certainly inconsistent with the anatomical condition. It matters not how small the caliber of the canal is, the tears will drain properly so long as no stricture or other cause

completely shuts off this little lumen. A canal as patulous as a very large probe would produce has never perhaps been seen in the living subject. Still, it is true that the caliber of the canal and the size of the lumen vary in different individuals and vary in the same canal.

The invariable slitting of the canaliculus, which is necessary in order to insert the very large probes, is an objectionable procedure. Unless there is a stricture or obstruction in the canaliculus, the slitting rather thwarts nature's effort for properly draining the tears. It destroys the even contact of the entire canaliculus with the eyeball, a very important factor. It also does away with the even pressure exerted by the lids during the act of winking which plays an important part in forcing the tears not only into the canaliculus but also into the sac as well.

Unless the whole length of the canaliculus, including its narrow opening into the sac, is cut and prevented from ever healing, the very large probe will do much damage. For, if this sac opening of the canaliculus is not cut—and it seldom is, or ever kept from healing when cut—the very large probe continually ruptures it and this finally ends in complete obliteration because of ensuing inflammation and cicatricial contraction. Unless this opening is cut, no very large probe can ever be inserted without danger. Not even rapid and excessive dilatation of the canaliculus and its sac opening will permit the entry of the classic large probe, without inflicting permanent injury. The normal calibre of the canaliculus and that produced by the very large probe have opposite tendencies in assisting the flow of tears into the sac; the former assists, the latter markedly retards the flow, because of the principle of capillarity.

In not slitting the punctum or a portion of the canaliculus, the repeated efforts at engaging the large probes will so irritate the surrounding tissues as to cause a thickening and even an eversion of the punctum. Not only this, but the passing of the very large probes without slitting punctum or canaliculus, often stretches the muscular coats so that their contracting power is forever destroyed. The same holds true for the opening of the sac into the nasal canal, as it also has a smaller calibre than the canal itself. Thus, both of these important orifices may be destroyed or obliterated be-

cause of the tearing by the very large probe producing cicatricial and granulation tissue.

In the passing of very large probes the frequent attending hæmorrhage is a serious drawback. It means that the tissues have been torn or fissured and that an inflammation will follow with a possible chance of the clot becoming organized, resulting in the formation of new strictures or an actual closure of the canal. Under these conditions one is liable to crowd and push the lining membrane in advance of the probe, either tearing it or making false passages. The constant repetition of this affair in the canal must certainly be followed by results of as grave a nature as the condition for which the probe was passed. In addition, the very large probe so crowds the ciliated epithelial lining of the canal against the bony wall as to often produce an actual necrosis in certain portions thereof. This lesion will of necessity be followed by cicatricial tissue and, perhaps, preceded by a rather violent inflammatory reaction. This ciliated epithelium is very essential, not only for the conducting of the tears, but to prevent infectious material from the nose gaining an entrance into the canal and sac. The ciliated epithelium materially assists in the capillary and suction drainage of tears into the nasal cavity.

The end result of the continued use of the very large probe is an abnormally patulous nasal canal with scarcely any normal epithelial lining. This undue size of the canal then freely admits noxious nasal secretions and thereby allows foci of infection. In addition, the frequent regurgitation of air through this canal upon blowing the nose is, to say the least, extremely annoying.

Last, but not least, is the great pain caused by passing these large probes through a canal of a smaller calibre than the diameter of the probe. This pain may last for several days and be accompanied by such an inflammatory reaction as to be quite alarming to both patient and physician.

It, perhaps, has been very apparent that no new objections to the use of very large probes have been raised. New ones are deemed superfluous, as the old ones furnish more than the requisite amount of evidence for the points at issue. Our enthusiasm has been largely responsible for the free use of the very large lacrimal probes. However, the error of our

way is gradually clearing up and the true status of the probe is near at hand. The teachings of some in this regard are receiving a severe blow from many a quarter, and deservedly so.

What has been said of the very large probe is equally true of the large style and canula. The particular shape of these large probes does not confer any special benefit as to safety or even end result. The writer is quite mindful of the fact that the admonitions given against the employment of the very large lacrimal probe are true to a limited extent for the small probe as well. The caution is: Do not use the very large probes, and the small ones as little as possible. In a certain sense, all probes are a menace.

The remarks in the paper can conveniently be summarized as follows: (1) Very large probes cause undue pain; (2) are liable to produce destruction of the membranous lining of the nasal canal; (3) are very prone to produce strictures, or at least cause undue damage to the small opening into the sac and into the nasal canal; (4) are apt to produce an unduly large lacrimo-nasal canal and thus invite infection from the nose or cause annoying influx of air into the canal upon blowing the nose; (5) necessitate undue slitting of the canaliculus, a procedure to be zealously avoided; (6) the possible obliteration of either the canalicular or nasal opening of the sac; (7) the ease with which hæmorrhages are caused in the nasal canal and the attending liability of the clot becoming organized and forming new strictures; (8) the resulting large lumen of the canal is of no actual benefit in conducting the tears to the nose.

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MEDICAL SOCIETIES.

SEVENTY-SECOND MEETING OF THE BRITISH MEDICAL ASSOCIATION.

HELD AT OXFORD, JULY 26TH TO 28TH.

SECTION OF OPHTHALMOLOGY.

First Day.

After a short address from the President, Mr. Marcus Gunn opened the formal discussion on Retro-ocular Neuritis. He described the symptoms of the disease, and insisted on the importance of the movements of the pupil. All degrees of failure of vision might be met with; the light sense was always defective, as was the power of discerning colors. The influence of the blood supply on the developement of the disease was alluded to, and the great rapidity of the failure of vision was noted. In many cases recovery was remarkably good, though more rarely the prognosis was bad. Great pain and tenderness indicates a severe lesion. Pallor of the disc was unusual, though it sometimes was but very slightly marked. One great source of difficulty was the rare opportunity we get of pathological examination. Dr. Berry thought that the defect of light sense was of the greatest importance, and he relied more on this than on the actual ophthalmoscopic appearance. In the cases due to influenza there was usually defect of taste and smell. Professor Uhthoff discussed the matter chiefly from the anatomical side. Mr. Higgins related a case of well marked optic neuritis which was due to meningitis in a young lady, which proved fatal, and although the eye became blind before death no ophthalmoscopic changes were visible. The nature of the case was proved by necropsy. Mr. Richardson Cross drew attention to the importance of the peripheral fields, and said that without this he should have great hesitation in diagnosing this condition; he described some cases. Professor Oliver described the methods he used for detecting the condition, and also gave details of some cases. Dr. Hill Griffith said that some cases were due to secondary scleritis.

He thought that it was almost impossible to mistake a functional case for one of retro-ocular neuritis. He also mentioned some cases. Mr. Nettleship discussed various matters raised by other speakers. Mr. Miller read short notes of three cases. He thought that many were of rheumatic origin. Mr. Gunn replied. Professor Poulton read his conclusions as to vision of birds based upon a consideration of mimetic color and the patterns on insects. His observations led him to believe that birds saw very much the same as we do, and the things which deceived our vision also deceived that of birds. Mr. McHardy read his paper on the Maturation and Extraction of Senile Cataract, and gave his conclusions as the result of many hundreds of cases; after maturation the cortex was never sticky and always came away easily. He strongly advocated a preliminary iridectomy. If posterior synechiæ were present this was a contraindication to maturation. Mr. Higgins gave up maturation years ago, and he never found any difficulty in getting the lens away. He never did an iridectomy if he could possibly help it. Mr. Hill Griffith had performed the operation often, and thought it had no danger and much facilitated extraction. Mr. Tatham Thompson thought the need of artificial maturation had disappeared now McKeown's operation of washing out the lens was available. Mr. Grossmann and Mr. Frank Thomas spoke, and Mr. McHardy replied. Mr. Grossmann read a paper on Astigmatism with Varying Axes, and gave a lantern demonstration. Dr. Berry thought that the size and eccentricity of the pupil was the cause of varying axes of astigmatism. Dr. Bull thought that many cases were early ones of keratoconus. Dr. Grossmann replied.

Second Day.

Work began with the discussion on Intraocular Hæmorrhage and Systemic Disease, which was opened by Dr. Hill Griffith. He related his experience of many cases and emphasized the apparent rarity of these cases and the importance of blood changes in their production. Dr. Lucien Howe exhibited a specimen of retinal hæmorrhage. Professor Uthoff showed sections and drawings of a subretinal hæmorrhage. Dr. Risley and Professor Oliver related cases which occurred in patients suffering from blood changes and

showed ophthalmoscopic drawings. Dr. George Carpenter had seen retinal hæmorrhages in children in a number of different diseased conditions. Dr. Hill Griffith briefly replied and thanked the speakers. Professor Hirschberg made some practical remarks on magnet operations. He thought that the occurrence of pain on the application of the giant magnet was most deceptive, pain did not always occur even when metal was present, and in might draw it from a comparitively harmless position into the ciliary body. He urged the importance of the use of the sideroscopic and x-ray photographs. He thought we were bound to remove the splinter if it were any way possible. Dr. Barkan advocated the improved sideroscope of Professor Hirschberg. Mr. McHardy advocated the use of the x-rays before applying the magnet. Dr. Mackay urged the necessity of early removal of the foreign body. Professor Hirschberg replied, and insisted upon the great damage sometimes done by searching for a foreign body which might not even be within the eye at all. Dr. Rivers demonstrated the result of his investigation on the comparative visual acuity of savages and civilized people. He found that, apart from errors of refraction, there was hardly any difference of visual acuity, any difference there was being due to familiarity with the surroundings and education, and man all over the world had much the same vision. In tropical countries visual acuity failed rapidly after about 35 years of age. Dr. Berry read his Remarks on the Diagnosis and Nature of Glaucoma. He thought that the pathology of the disease was still obscure, and gave a summary of von Graefe's opinions on the subject. Dr. Berry thought that the use of miotics in simple glaucoma was useless, he had never seen sclerotomy do much good, and he had given up the performance of large iridectomies. Mr. Richardson Cross thought that in doubtful cases without inflammation cocaine should be used, and then arterial pulsation might be seen in true cases; should tension be present, operation was indicated, except in old and very diseased conditions. He thought that the continued use of miotics was useful, especially in early cases. Eserine irritation must be guarded against, and the earlier an operation was undertaken the better. Dr. Wherry and Professor Hirschberg made some

remarks; the latter condemned the operation done on the two eyes together, and thought that the irritation following the use of eserine was due to septic solutions. Professor Uhthoff gave some statistics and Dr. Berry replied. Mr. Adams Frost read a paper on the Operative Treatment of Myopia. He rather tended to the opinion that retinal detachment was more frequent after the removal of the lens than before. He was averse to operating on the two eyes. Professor Landolt thought the removal of a clear lens was a dangerous procedure and that by no means had all the unsuccessful cases been published. He would operate on one eye only. Mr. Johnson Taylor thought that repeated small needlings were safer than free discission and letting out of the lens. Mr. Frost replied. Mr. Ernest Clarke read a paper on Twenty Years' Treatment of Myopia. He advocated the full correction of myopia for all purposes. Dr. McGillivray discussed the Temperature of the Cornea and its Relation to Corneal Therapeutics, and advocated the use of oily solutions of cocaine to remove photophobia.

Third Day.

The discussion on Keratitis Profunda was opened by Mr. W. T. Holmes Spicer. He found that overeating and drinking, with its accompaniments, were responsible for about three-fourths of the cases, and of those that were traced to the end the prognosis was good in all the slighter cases. The symptoms and pathology of the disease were then described, and with regard to treatment the use of atropine with hot formentations advocated, unless the tension were high, when it should be used with caution; paracentesis was the most satisfactory operation for its relief. He had never found subconjunctival injections useful; but the treatment of the general condition was most important. Mr. Power related some cases, and Mr. Cyril Walker and Dr. Hill Griffith alluded to the close simulation of these cases to interstitial keratitis. The treatment was discussed by Mr. Grainger and Dr. Koller. Mr. Spicer replied. Dr. Koller read a paper on the Subconjunctival Injection of Cocaine in the Extraction of Cataract. He found that injecting a few drops of cocaine beneath the conjunctiva did far more to anæsthetize the eye

than simply instilling it. Mr. Doyne said that he nearly always used it for enucleation. Dr. Lucien Howe demonstrated the results he had obtained from his inquiries into the time required for a normal eye to swing laterally through a given arc. The President who had been working independently at the same subject, made some remarks, and Dr. Gillivray asked if observations had been made on cases in which advancement and tenotomy had been done. Mr. Hill Griffith thought it might be useful in cases of alcoholism to measure the movements of the eyeball, and Mr. Johnson Taylor asked if it had been used in cases of nystagmus. Dr. Howe said he had not used it on alcoholics. Mr. Watson Griffin demonstrated a modified suction syringe for the removol of the lens matter after the needling of a cataract. Professor Hirschberg went into the history of suction operations. Mr. James Hinshelwood related a case of pure word blindness with right homonymous hemianopsia, with pathological examination by Drs. McPhail and Ferguson. He also described a case of congenital word blindness. Mr. Bishop Harman said the condition of congenital word blindness was well known in London schools. Mr. Stephenson did not think it was anything like so rare as was supposed, and he had himself reported 2 cases in boys. Remarks were made by Messrs. Wherry, the President, and Dr. Harris. Mr. Hinshelwood replied. Dr. George Carpenter related a case of retinitis in a child with large white kidneys. Mr. Bishop Harman read a paper on Follicular Conjunctivitis, and gave statistics he had obtained among school children. He drew attention to the influence of pediculi in the children's heads on the conjunctival condition. Dr. G. H. Burnham read a paper on Combined Treatment in Disease, especially of the Uveal Tract. This consisted of the hypodermic injection of pilocarpine and the internal administration of mercury and iodide. Dr. A. Bronner related a case of septic thrombosis of the cavernous sinus due to lateral empyema of the sphenoidal cells. The case had a fatal termination, and the results of the necropsy were given.

ABSTRACTS FROM MEDICAL LITERATURE.

By W. A. SHOEMAKER, M.D.

ST. LOUIS, MO.

NOTES ON RADIUM.

Francis H. Williams (*Boston Med. and Surg. Jour.*, May 26) states, that physicists now consider that the beta rays from radium correspond to the cathode rays and the gamma to the X-rays. The beta rays seem likely to prove a convenient and useful remedy in certain diseases of the eye, particularly those which have not yielded to other methods of treatment. Among these are trachoma, opacity of the cornea, and inflammatory conditions of the neighboring parts. The writer has observed good results follow promptly from exposures of two or three minutes to ¾ gr. of pure radium bromide, given at first once a week and later twice a week. The radium was held about $^1/_5$ inch from the everted lid, or was placed even nearer to the closed lid opposite the diseased area. The advantages of radium over the X-rays are apparent. The output of the rays from radium is uniform, and the rays may be easily applied. The greatest care should be employed when diseases of the lids or eyes are treated with this powerful agent. Radium is also an excellent test for determining whether or not the eyes of the practitioner are in a suitable condition for making fluoroscopic examinations. The spinthariscope containing a bit of radium is employed. If the scintillations appear bright to the practitioner, his eyes are ready for use; if dull, he must wait for a while longer in the dark room before attempting to make a fluoroscopic examination.